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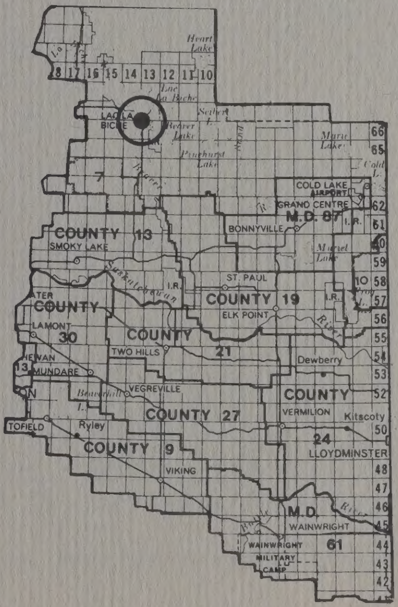
A CONSENSUS OF

COSTS AND RETURNS

GRAIN SILAGE
150 ACRES

300 ACRE FARM
LAC LA BICHE



NORTH EAST ALBERTA

MARKETING DIVISION – ALBERTA DEPARTMENT OF AGRICULTURE

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A CONCENSUS OF COSTS & RETURNS
FOR
GRAIN SILAGE PRODUCTION

150 Acres of Silage
Lac La Biche Area

By

C. A. Nelson

Regional Farm Economist

The author wishes to acknowledge the assistance of the farmers in the Lac La Biche area who provided the basic data; and H. Yoder, the District Agriculturist of the Lac La Biche area who participated in the gathering of data and assisting in the preparation of this report. Special thanks to E. L. Treffry, Regional Plant Supervisor, for his contribution to the "Introduction" section of this CRD.

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INTRODUCTION

Silage, one of the oldest forms of feed storage, is just "coming of age" in the Lac La Biche district as it is in much of Northeastern Alberta. Farmers must weigh the advantages and disadvantages of silage and see if it will benefit their particular operation. Forage does benefit the grey wooded soils and silage is one form of forage storage to be considered.

Forage improves crop production and consequently net returns per acre. This is illustrated by research data from the Melfort Research Station.

TABLE 1 EFFECT OF A STRAIGHT GRAIN AND GRAIN FORAGE ROTATION ON CROP PRODUCTION: RETURN PER ACRE AND THE NITRATE CONTENT OF FINE SOIL

TABLE 1

Straight Grain 1/

	No. of	Yield LB/AC		Rts./Acre		NO3-N-1B/AC 3/	
Location	Years Data	Fallow	Stubble	Gross	Net	Fallow	Stubble
1	12	2156	1824	33.16	17.88	74	40
2	18	1834	1235	25.58	8.86	58	17
3	14	1894	1281	28.43			
4	14	2514	1576	34.08	17.46	48	21
5	28	1269	818	20.17			

Grain Forage Rotation 2/ (6 Year)

Location	Years Data	Fallow	Stubble	Gross	Net	Fallow	Stubble
1	12	2192	1856	35.90	20.33	97	61
2	18	1801	1384	34.14	18.27	49	43
3	14	1711	1284	35.18			
4	14	2838	1835	40.31	22.40	64	32
5	28	2097	1507	34.80			

1/ 3-Year Rotation - Fallow, wheat, and cereal.

2/ 6-Year Rotation - Fallow, wheat (undersown), hay, hay (break), wheat, and cereal.

3/ Return $/Acre for all crops in rotation, based on average farm prices and cost of production during the term of each study averaged over total acreage involved in rotation, and nitrate nitrogen measured in the surface 2 feet of soil in the fall prior to seeding. Six, four and five-year average at site 1, 2, and 4 respectively.

Other benefits of the grain-forage rotation are:

(1) Improvement of soil structure.
(2) Improvement in water holding capacity.
(3) Weed Control.
(4) Increased in root fibre content of soil.

TABLE 2 COMPARISON OF SILAGE PRODUCING CROPS

Production/Acre - Crops Harvested as Silage -- Yield/Acre

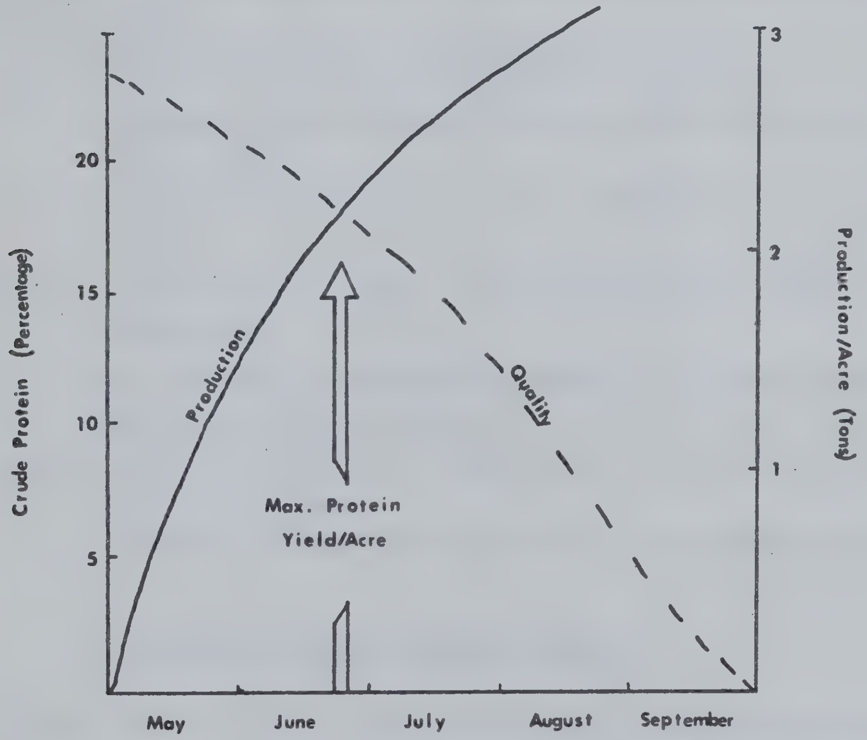
Crop	Yield / Acre	Proper Stage	Fresh Wt. T.	DM Lbs.	Deg. Prot.	Net Energy	TDN Lbs.	Tons-Silage/Acre 80%	75%	70%	66%
Corn	100 Bu/Acre	Dented	20	12000	540	6394	7333			18	16½
Alfalfa	4 Tons Hay	E. Bloom	17	6800	826	3097	3672		12	10½	9
Red Clover	3 Tons Hay	E. Bloom	13	5100	514	2681	3085		9	8	7
Leg/Grass 50/50	4.5 Tons Hay	E. Bloom	18	7200	525	3532	4218	16	13	10½	10
Bromegrass	3½ Tons Hay	E. Heading	15	6000	432	2830	3348	13½	11	9	8
Oats	70 Bus.	Dough	15	6000	383	2921	3429	-	11	9	-
Wheat	40 Bus.	S. Dough	10½	4200	178	1565	1954	-	7½	6½	-
Barley	60 Bus.	S. Dough	11½	4650	435	2281	2599	-	8½	7	-
Rye	40 Bus.	Before Heading	7½	3000	254	1477	1974	-	5¼	4½	-

Silage can offer a method of putting up forage in a manner which avoids many of the field and storage losses.

Losses of Alfalfa

	Field Losses	Storage	Preserved For Feeding
Field Cured Hay (Rain Damage)	32.6%	4.0%	63.4%
Field Cured Hay (No Rain)	17.4%	3.6%	79.0%
Wilted Silage	5.8%	11.0%	83.2%

FIGURE I Effect of Haying Date on Yield and Protein Content of Hay and Silage



This can be further illustrated using oat silage.

Stage of Maturity	Moisture at Harvest	Protein	D.M. Per Acre
Boot	86.5%	16.99%	1.08
Head	82.7%	14.59%	1.52
Flower	78.1%	11.63%	1.91
Mild.	72.3%	12.28%	2.16
Dough	67.1%	8.42%	2.88
Seed	58.6%	8.06%	2.62

OBJECTIVES

This report was prepared to provide an estimate of costs of production and the expected returns from a 150 acre oats/barley silage system using two different harvest procedures. In addition, a comparison of grain and grass silage costs are included. Such information can be an important guide in decision-making, but the reader should keep in mind that costs vary between producers because of differences in land and cultural practices. The farmer's own records are essential to determine what it actually costs to produce a crop on his particular farm.

This report can be useful for management decisions:

1. In selecting the enterprise or crop rotation yielding the highest returns.
2. In determining the amount of cash required to operate during a season.
3. In determining the amount of time expected to be spent on an enterprise.
4. For projecting the expense and income when considering new investments requiring credit.
5. In determining how the expenses and receipts should be shared in rental arrangements.
6. To compare to actual costs incurred in your farming enterprises.

SOURCE AND METHOD OF DATA COLLECTION

The information for the report was gathered from a group of farmers from the district. A day was spent with them discussing the direct costs involved, the complement of machinery needed to produce the crop and the cultural practices carried out. This information was compiled and costs calculated to determine the total cost of production for the crop.

ASSUMPTIONS SPECIFIC TO THIS STUDY

(1) The farm consisted of 450 acres with the following rotation:

Silage 150 acres

(2) Annual use of machines was based on the above cropping pattern.

(3) Yield per acre was based on averages expected by the producers with the inputs and operations described in the cost operations:

Crop	Yield	Value
Grain Silage	5 Ton (wet basis)	$10.00/Ton

(4) Labor was usually traded and multiples of two worked best. There are four harvest activities: swath, harvest, haul and pack. These operations are more easily divided among two or four men than three.

(5) Pit size: 35' x 150' x 8' valued at $200 with a life of 20 years.

(6) Value of land: $40.00/acre and taxes at $1.30/acre.

(7) Interest rates: Machinery ÷ 8½%; land and buildings ÷ 8.0%.

(8) Tractor and machine operating costs are based on 1972 data from the Alberta Department of Agriculture.

(9) Harvest costs were adjusted linearly for yield variations above and below the 5 tons per acre as reported in Table B. For example, the cash harvest costs for 6.0 tons per acre were calculated as follows:

$$(6/5) \times \$4.19 = \$5.03 \text{ per acre.}$$

Silage can provide an alternative to hay in many livestock enterprises. Silage can be made from a great number of crops even those damaged by weather. As shown previously, with silage little nutrient loss occurs due to weathering and leaf shattering. Silage keeps better than hay and can be stored indefinitely if protected. The harvesting, storage and feeding of silage can be almost completely mechanized. The cost to do this can initially be high and may even be more expensive than for an equivalent haying operation.

The alternatives of silage must be considered and evaluated before a decision on forage management can be decided upon for any one particular farm.

TABLE 3 COST COMPARISON OF HARVEST EQUIPMENT

	A 2 Wagons [1/]	B 1 Wagon - 1 Feed Wagon [2/]
Cash Cultural	$9.10	$9.10
Cash Harvest	4.19	4.35
Cash Overhead	1.50	1.50
Non Cash Overhead	17.49	20.47
Operators Labor	4.75	4.75
TOTAL COSTS	$37.05	$40.17
Costs Per Ton	$7.41	$8.03

The differences in operation are in harvest, and non cash overhead costs are reflected in the two systems. Harvest costs are $0.16 more per acre using one wagon and one feed wagon. Interest and depreciation costs are also greater by $2.98/acre.

GRASS SILAGE VS. GRAIN SILAGE

Although this CRD was conducted originally on grain silage, interest was expressed in the costs of production for grass silage. Yields would be:

Year	Crop	Yield
1	Grain Nurse Crop	5 Tons/Acre
2	Grass	5 Tons/Acre
3	Grass	5 Tons/Acre
4	Grass	4 Tons/Acre
5	Grass	3 Tons/Acre
	AVERAGE	4.4 Tons/Acre

[1/] Home built box on chassis.

[2/] Self-unloading wagon with feature for dispensing silage from the side.

Average yield for the five years is 4.4 tons. The first year's cost would be the same as for grain silage plus $4.00 for seed. Fertilizer was applied each of the 4 years in grass at $4.00/year applied. Each year there are harvest costs of $4.19 amounting to $16.76 for the four years. Total costs for the four years are:

Fertilizer	$4.00 x 4 years	$16.00
Seed	$4.00 x 1 year	4.00
Cash Harvest	$4.19 x 4 years	16.76
Year 1 - Total Costs	$37.03 x 1 year	37.03
Cash Overhead	$1.50 x 4 years	6.00
Non Cash Overhead	$17.49 x 4 years	69.96
Labor (harvest)	$1.36 x 4 years	5.44
		$155.19

The average cost per ton for the 5-year rotation is $7.05 ($155.19/22 Ton).

COST SUMMARY

	Yield	A	B	Grass
Wet Basis	5 Ton	7.41	8.03	7.05
Dry Basis	2 Ton	18.52	20.07	17.62

The summary above shows the costs per ton of grain and grass silage on a dry and wet basis. The grass program shows little cost advantage over the grain program. Comparison between grass and grain are made using two wagons (A).

821-A

C.R.D. No. ____

Consensus Cols. - 1, 7, 8, 9

PRODUCTION COSTS

CROPS & FORAGE

Date January 1972

Reg. Ec. C.A. Nelson

D.A. H. Yoder

County Lac La Biche

Grain Silage (Crop) 150 (Acres)

(1) OPERATIONS	(2) Hours Per Acre Equip.	(3) Labor	(4) Cash and Labor Costs Per Acre Operator	(5) Hired	(6) Fuel & Repairs	(7) Materials Kind	(8) Quantity	(9) Cost/Unit	(10) Cost	(11) Total Cost Per Ac.
Cultural			$	$	$			$	$	$
Chisel Plow	.20	.22	.44		0.35					0.35
Plow	.40	.44	.88		0.86					0.86
Disc & Harrow	.25	.28	.55		0.45					0.45
Seed-	.29	.32	.64		0.67	Barley/Oats	2½ Bu.	$1.00	2.50	3.17
- Fertilize						16-20-0	100 Lbs.	$0.035	3.50	3.50
Rock Pick	.40	.44	.88		0.77					0.77
			(3.39)						CASH CULTURAL COSTS	9.10
Harvest ____ cuttings										
Swath	.22	.24	.48		0.38					0.38
Harvester	.40	.44	.88		1.10					1.10
Wagons (2)	.40	.44		.66	0.57					1.23
						Plastic	--	$60.00	0.40	0.40
Packing	.40	.44		.66	0.42					1.08
			(1.36)						CASH HARVEST COSTS	4.19

Cash Overhead

Phone $____ Crop Insurance $____ Stationary, etc. $____ $30.00	0.20
Taxes 1 Years at $195.00	1.30
Rent $____ Average Operating Capital at 8½ % $____	
Building Insurance $____ Labor Insurance $____ Machinery Insurance $____ $15.00	0.10
CASH OVERHEAD COSTS	1.50

	(5)	(6)	Overhead	(10)	
TOTAL CASH COSTS/ACRE	1.32	5.57	1.50	6.40	14.79
EXPECTED CASH RETURNS PER ACRE					50.00
GROSS CASH MARGIN					35.21

LABOR/HOUR
Operator - $ 2.00
Skilled - $____
Unskilled - $ 1.50

RETURNS/ACRE

Crop	Yield		Value
Silage	5T	@	$10.00
		@	$

821-A

PRODUCTION COSTS
CROPS & FORAGE

				(10) Total Cost Per Acre $
TOTAL CASH COSTS PER ACRE (821-A, page 1), columns 5 + 6 + 10				14.79
AV. INVESTMENT PER ACRE TO STUDY CROP		FIXED COST PER ACRE		
Item	Per Acre	Depreciation	Interest	
Land	$ 40.00	$ --	$ 3.20	3.20
Crop Supplies	--	--	--	0
Buildings	0.67	0.07	0.05	0.12
Equipment	64.47	8.69	5.48	14.17
Total				
NON-CASH OVERHEAD				17.49
OPERATOR'S LABOR				4.75
TOTAL NON-CASH COSTS PER ACRE				22.24
(A) TOTAL COSTS PER ACRE				37.03
- Operator's Labor				
(B) = Total Cost less Operator's Labor			$32.28	
- Interest on Land				
(C) = Total Cost less Operator's Labor and Interest on Land			$ 29.08	
(D) EXPECTED GROSS RETURNS PER ACRE				50.00
RETURNS TO OPERATOR'S LAND, LABOR AND MANAGEMENT (D-C)				20.92
RETURNS TO OPERATOR'S LABOR AND MANAGEMENT (D-B)				17.72

Table B

RETURNS PER ACRE TO OPERATOR'S LAND, LABOR AND MANAGEMENT AT VARIOUS YIELDS AND PRICES

COSTS PER UNIT (e.g. Bu.) AT VARIOUS YIELDS

	Crop Grain Silage Area Lac La Biche	Yield TONS Per Acre						
		-30%	-20%	-10%	Average	+10%	+20%	+30%
		3.5	4.0	4.5	5	5.5	6.0	6.5
RETURNS PER ACRE	Price per Ton							
	7.00	-3.32	-0.24	2.84	5.92	9.00	12.08	15.16
	8.00	0.18	3.76	7.34	10.92	14.50	18.08	21.66
	9.00	3.68	7.76	11.84	15.92	20.00	24.08	28.16
	10.00	7.18	11.76	16.34	20.92	25.50	30.08	34.66
	11.00	10.68	15.76	20.84	25.92	31.00	36.08	41.16
	12.00	14.18	19.76	25.34	30.92	36.50	42.08	47.66
	13.00	17.68	23.76	29.84	35.92	42.00	48.08	54.16
COSTS PER TON	Cash Cultural Costs	2.60	2.27	2.02	1.82	1.66	1.52	1.40
	Cash Harvest Costs	0.84	0.84	0.84	0.84	0.84	0.84	0.84
	Cash Overhead Costs	0.43	0.38	0.33	0.30	0.27	0.25	0.23
	Total Cash Costs	3.87	3.49	3.19	2.96	2.77	2.61	2.47
	Non-Cash Overhead	5.00	4.37	3.89	3.50	3.18	2.92	2.69
	Operator's Labor	1.24	1.12	1.02	0.95	0.89	0.84	0.80
	Total Costs	10.11	8.98	8.10	7.41	6.84	6.37	5.96

821-C

INVESTMENT SCHEDULE

C.R.D. No. 52/1/72
Consensus Cols. - 1, 2, 4, 5, 7, 12, 13, 14, 15
County Lac La Biche

Crop Grain Silage Acres 150

Reg. Ec. C. A. Nelson
D.A. H. Yoder

(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
								Study Crop								
EQUIPMENT	Size	Cost Price	Salvage Value	All Crops Coverage Acres	Study Crop Coverage		Life Yrs.	Annual Costs		Annual Costs/Ac.		Power H.P.	Acres/ Hour	Cash Costs/Hour		
					Acres	%		Deprec.	Int.*	Deprec	Int.*			Fuel	Repairs	Total**
Chisel Plow	12"	$ 1145	$ 250	300	150	50	10	$ 0.45	$ 0.21	$ 0.30	$ 0.14	75	5.0	$ 0.01	$ 0.27	$ 1.76
Moldboard Plow	Sbtm	1800	390	250	150	60	10	0.85	0.40	0.56	0.27	75	2.5	0.01	0.66	2.15
Disc & Harrow	12'	1700	370	300	150	50	10	0.66	0.28	0.44	0.19	75	4.0	0.01	0.30	1.79
Swather	13½'	3895	970	450	150	33	10	0.96	0.55	0.64	0.37	S.P.	4.5	0.64	1.08	1.72
Harvester	Med.	3245	595	300	150	50	10	1.32	0.52	0.88	0.35	75	2.5	0.02	1.25	2.75
Wagons (2)		1300	125	150	150	100	15	0.78	0.55	0.52	0.37	50	2.5	0.01	0.11	1.43
Loader		1250	270	180 hrs.	50 hrs	30	10	0.29	0.14	0.20	0.09	60	---	0.01	0.17	1.24
Rock Picker		2630	570	300	150	50	10	1.03	0.49	0.69	0.33	50	2.5	0.01	0.60	1.92
Drill	12'	2815	330	300	150	50	15	0.83	0.55	0.55	0.37	50	3.5	0.04	0.98	2.33
				HRS/YEAR	HRS/ YEAR											
Tractor	75-D	9700	3670	470	235	50	10	3.02	2.14	2.01	1.43	75	---	0.86	0.62	1.48
Tractor	60-D	7000	2650	300	60	20	10	0.87	0.71	0.58	0.47	60	---	0.65	0.41	1.06
Tractor	50-G	5800	2190	350	165	55	10	1.99	1.65	1.32	1.10	50	---	0.96	0.35	1.31

* Interest on Equipment 8.5%
** Includes tractor complement where applicable.

FIXED COSTS TO STUDY CROP Grain Silage (Crop)

LAND, BUILDINGS, EQUIPMENT, ETC.	Cost Price	Average Value	% to Crop	Life Yrs.	Fixed Costs on 150 Acres				Total
					Deprec.	Int.*	Other	Other	
Land (____ Years)	$ 6000	$ 6000	100	XX	$ XX	$ 480	$	$	$ 480
Supplies, Shop, Tools				XX					
Pit	200	100	100	20	10	8			18
Equipment	42,280	25,011	38	XX	1305	819			2124
TOTAL	48,480	31,111			1315	1307			2622

* Interest on land, bldgs. 8%

Cropland Acres		
	150	Acres
		Acres
		Acres
		Acres
		Acres
Total	600	Acres

PRODUCTION ECONOMICS BRANCH

ECONOMICS DIVISION